



RF



ORANGE COUNTY AMATEUR RADIO CLUB, INC.

VOL. LXVI NO. 2

PO Box 3454, Tustin, CA 92781

February 2025

The Prez Sez... By Dan KI6X



I will attempt a new picture each month like Nicholas liked to do. This month is me with some of my antiques. My wife really likes antique shopping and I enjoy but prefer things that do something. Therefore, I have some phonographs, AM (SWL) radios, stereoscopes with cards, tru-view scopes with reels of photos (similar to Viewmaster but 35mm film double pictures - 3D - pulled through viewer), and old Viewmasters. In my picture this month (all working) is my c.1915 Edison phonograph, an early 30's film plate camera and a late 40's Viewmaster (original round shape you open to put in the picture reel). I was unhappy that we had to cancel Winter Field Day at the last minute. We are planning to have a Plan B next time so that it does not need to be cancelled. It will be something like 30' push up

masts instead of the 50' towers and maybe less stations. We were most concerned that we would be short workers (in the rain) on Sunday to take down the tall towers. There was also a slight chance of lightning on Sunday. So, be ready for a gung-ho summer Field Day.

As always, I ask you to read the RF when it comes out since it is our best way to get the news to the members. Also check out the website: W6ZE.ORG. It is a quite extensive website and Bob (AF6C) spends at least 40 hours on average a week maintaining and updating. What we need is text authors for sections that have gotten out of date (for example Emergency Communications).

Important highlights from the Board meeting. April and May membership meetings will be the 4th Friday (Easter and room availability reasons respectively). We also decided to reduce Zoom meetings to where it is needed to accommodate the speaker. A lot of work is involved for 0-4 remote people. We prefer to meet face to face! Thank you for being a member and don't forget end of March is the deadline to renew to continue your membership this year.

73 DE KI6X

NEXT GENERAL MEETING

**Neil Jessen
N6VHF
presents**

"POTA and WFD"

**February 21st, 2025, at 7pm
at the**

**American Red
Cross**

**Orange County Chapter
Santa Ana, Room 208**

NEXT BOARD MEETING

Saturday, April 5th, 2025

See www.w6ze.org for more info

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Monthly Events

Membership Meetings*

Time: 7:00 PM
When: 3rd Friday of each Month
Red Cross Orange County, Room 208
600 N Parkcenter Dr, Santa Ana
(Replaced by the Christmas Party
in December.)

Board Meetings

First Saturday of each Month
*Board will handle Club business now
IN-PERSON.*

Club Nets (Listen for W6ZE)

10M ~ 28.375 MHz SSB

Wed- 7:30 PM - 8:30 PM
Net Control: Corey, KE6YHX
Alternate Net Control: AJ, KN6WNO

2M ~ 146.55 MHz Simplex FM

Wed- 8:30 PM - 9:00 PM
Net Control: Corey, KE6YHX
Alternate Net Control: AJ, KN6WNO
Echolink Node: KK6TRC-L

75M ~ 3.883 MHz LSB

Tue @ 8:00 PM
Net Control: Corey, KE6YHX

Other Nets

**Catalina Amateur
Repeater Association (CARA)**
147.090 MHz (+0.600 MHz) No PL
Monday - Friday
9:00AM & 9:00PM
Prg. Director. Tom W6ETC
COME JOIN US

OCARC 2025 DUES:

*Membership period is:
1 January to 31 December*

Individual New or Renewal: \$30
Family New or Renewal: \$45
Teen New or Renewal: \$15

***New Member Dues** are prorated
quarterly and includes a badge:*
Additional Badges¹ \$3

Use one of our interactive online forms
to calculate current prices, join, renew, or
order badges:

<https://www.w6ze.org/FormsShortcut.html>

¹ \$3 or less + mailing. See form.

Guest Speaker Spotlight

February 2025

Neil Jessen N6VHF – Parks on the Air



Neil Jessen, N6VHF, has been an active amateur radio operator since 1987. Holding an Advanced Class license, he has explored a wide range of radio activities, including contesting, DX-ing, satellite communications, weak signal VHF/UHF, 10 GHz microwave, meteor scatter, packet radio, and most digital modes. Neil has been a key player at many W6ZE summer and winter Field Days - as both an excellent operator, and as a patient mentor to others. His passion for portable operating has made Field Day one of his favorite events, leading him to develop a deep appreciation for Parks on the Air (POTA). For Neil, POTA combines the excitement of operating in the field with the opportunity to explore scenic park locations. He enjoys sharing this passion with fellow ham radio operators and looks forward to introducing others to the excitement of Parks on the Air.

 N6VHF Neil Jessen QTH: San Bernardino County, California, USA 							
RECENT ACTIVATIONS							
Date	Ref	Loc	Park Name	CW	Data	Phone	Total
2025-01-25	US-3445	US-CA	Huntington State Beach	13	0	47	60
2025-01-25	US-1141	US-CA	Crystal Cove State Park	7	0	4	11
2025-01-25	US-9757	US-CA	Butterfield Overland National ...	0	0	35	35
2025-01-24	US-7377	US-CA	Bolsa Chica Ecological Reserve...	0	0	10	10
2025-01-20	US-9757	US-CA	Butterfield Overland National ...	17	0	86	103
2025-01-04	US-4544	US-CA	San Gabriel Mountains National...	2	0	109	111
2025-01-04	US-4453	US-CA	Angeles National Forest	2	0	109	111
2025-01-03	US-4544	US-CA	San Gabriel Mountains National...	44	0	18	62
2025-01-03	US-4453	US-CA	Angeles National Forest	44	0	18	62

Neil's POTA Activations in 2025 [License Upgrade Opportunities](#)



Your Club, W6ZE, now offers license exam testing sessions (new licensees and upgrades) at 5:30 PM before our regularly scheduled meeting at 7 PM. Requests for a seat should be sent to Ken Simpson, w6kos@w6ze.org, or a call at 714-651-6535. The cost is \$15. That's 5:30 p.m. for testing in Room 213 and a 7 p.m. meeting at 600 Parkcenter Dr, Room 208, Santa Ana, at the American Red Cross.



FYI, March 31 is the deadline for the 2025 OCARC dues. The membership roster will be updated April 1, no fooling, listing only payed up members. Those who renew after March 31 will have their names added to the membership roster. Renewal dues are \$30 no matter what day they are received and will only be applied towards 2025 membership, in other words, no partial payment covering only the remainder of 2025.

RadioActivity

February 2025

Upcoming Activities:

FEBRUARY

- ***CQ WW WPX / RTTY** 0000 UTC Saturday Feb. 10 through 2359 UTC Sunday Feb. 11
- ***ARRL International DX Contest CW:** 0000 UTC Sat. Feb 17 through 2359 UTC Sunday Feb. 18
- ***CQ WW 160 Meter SSB:** 2200 UTC Friday Feb. 23 through 2200 UTC Sunday February 25
- **North American QSO Party/RTTY:** 1800 UTC Sat. Feb 24 through 0559 UTC Sunday Feb. 25

MARCH

- ***ARRL International DX SSB Contest:** 0000 UTC Saturday March 2 through 2359 UTC Sunday March 3.
- ****North American Sprint / RTTY:** 0000 UTC through 0359 UTC Sunday March 10
- ***CQ WW WPX Contest / SSB:** 0000 UTC Saturday March 30 through 2359 UTC Sunday March 31
- * Indicates club entries are accepted
- ** Indicates team entries are accepted

Note: When submitting logs for ARRL Contests indicate your club affiliation as "Orange County ARC"

State QSO Parties

- **Vermont QSO Party:** 0000 UTC Saturday February 1 through 2359 UTC Sunday Feb. 2
- **Minnesota QSO Party:** 1400 through 2400 UTC Saturday February 1
- **South Carolina QSO Party:** 1500 UTC Saturday February 22 through 0159 UTC Sunday Feb. 23
- **North Carolina QSO Party:** 1500 UTC Sunday Feb. 23 through 0100 UTC Monday Feb. 24
- **Oklahoma QSO Party:** 1500 UTC Saturday March 8 to 0200 UTC Sunday March 9 and 1500 UTC to 2100 UTC Sunday March 9
- **Idaho QSO Party:** 1900 UTC Saturday March 8 to 1900 UTC Sunday March 9
- **Wisconsin QSO Party:** 1800 UTC Sunday March 9 to 0100 UTC Monday March 10
- **Wisconsin QSO Party:** 1800 UTC Sunday March 9 to 0100 UTC Monday March 10

Repeating Activities:

- **Phone Fry:** Every Tuesday night at 0230 UTC to 0300 UTC
- **SKCC:** Weekend Sprintathon (Straight Key CW) on the first weekend of the month after the 6TH of the month. 1200 UTC Sat. to 2400 UTC Sunday.
- **SKCC:** Sprint (Straight Key CW) 0000 UTC to 0200 UTC on the 4th Tuesday night (USA) of the month.
- **CWops:** Every Wednesday 1300 UTC to 1400 UTC, 1900 UTC to 2000 UTC and Thursday 0300 UTC to 0400 UTC
- **ICWC Medium Speed Test:** (CW, 25WPM Max.) Every Monday. 1300 UTC to 1400 UTC and 1900 UTC to 2000 UTC and Tuesday 0300 UTC to 0400 UTC
- **K1USN Slow Speed Test:** (CW, 20WPM Max.) Every Friday 2000 UTC to 2100 UTC Every Sunday night at 0000 UTC to 0100 UTC Monday

OCARC Club Nets:

- **75 Meter Net:** Every Tuesday night at 8:00 pm to 8:30 pm Local Time. SSB 3.883 MHz
- **10 Meter Net:** Every Wednesday night at 7:30 pm to 8:30 pm Local Time. SSB 28.375 MHz
- **2 Meter Net:** Every Wednesday night at 8:30 pm to 9:30 pm Local Time. FM Simplex 146.55 MHz

Other Nets:

- **Net-AT-9:** Wellness & Support Monday thru Friday 9:00 am and 9:00 pm Local Time 147.090 MHz (+600 MHz) No PL

Other Links:

- [ARRL Contest Calendar](#)
- [VOACAP Online for Ham Radio](#)

Send an email to Ron W6WG, w6wg@w6ze.org to have your favorite activity or your recent RadioActivity listed in next month's column.

General Meeting Minutes

January 17, 2025

The meeting began with the Pledge of Allegiance.

Everyone in attendance took a moment to introduce themselves.

Tim N6GP Vice-President and Janet Margelli KL7MF Director at Large introduced tonight's speaker. Riley Hollingsworth K4ZDH presented a very interesting program from his home in Gettysburg PA via Zoom. Since 2019 he has been the Administrator of the new FCC/ARRL Volunteer Monitoring Program with over 160-182 Volunteer Monitors averaging several thousand hours a month listening to our bands healthy and to preserve Amateur Radio's great reputation. He explained that you could check out what is being monitored by the FCC in QST.

After a break the meeting continued with club business.

Board Meeting

A quorum of club officers were in attendance.

Discussion was held regarding Winter Field Day. Ron W6WG informing all of the field day logistics starting with Friday morning Jan 24th to gather equipment and set up antennas, tents etc. Ron asked members to meet early on Sat as field day starts at 9am this year, Ron passed out an itinerary with proposed stations/members. Field day will commence at 9am Sat. January 25 and ends Sun January 26 at 3p.

Reminders that dues are due for this year. At this time we have 108 members.

AJ W6OTO suggested starting an Echolink Net in the future.

Good of the Club

Discussed the current fires in LA and how we may help, suggestions made to support our Red Cross since they are playing a big part in this disaster.

Our thoughts and prayers go to Ken Simpson, W6KOS who is currently in the hospital. Our VE sessions for exams continue with 5 passing tonight.

Also discussed ways to encourage new members to join our club.

8:52 pm Motion to adjourn made seconded and passed.

Submitted by Joyce KN6UKJ

Board of Directors Minutes

February 1, 2025

OCARC Board Meeting Minutes for February 1, 2025.

The OCARC board meeting was held at the Streamliner Lounge, 186 N. Atchison St. Orange and was called to order by President Dan Violette KI6X at 8:15am. A quorum of Board Members were in attendance.

Directors Reports

Treasurer Report: Tim N6GP reports we ended last year 2024 with a surplus of \$700. Financial audit committee to meet after this meeting. The Treasurer's "Cash Flow-Year to Date" report is shown below.

Membership Report: Ron W6WG reports there are currently 108 members, 4 are honorary members. A lengthy discussion was held regarding returning members and new members with dues required, Corey pointing out the bylaws.

Secretary Report: Tim M. N6TMT will work on setting up both options of "informed delivery" which will show images of each item arriving daily, and the second option which releases a notification when items are posted into the box. The email address is POB3454@w6ze.org.

Publicity Report: VE sessions for amateur license testing continues monthly held prior to our general meetings at 5:30p. AJ is working on placing new brochures in HRO etc with Bob AF6C working on creating an updated brochure with a QR code. Dan KI6X will have them printed. About \$270 for 500 folded. Approved by Board.

Newsletters Editors Report/Old Business

February: Ron W6WG

March: Tim N6GP

April: Bob AF6C

Speaker/Entertainment

February: Neil N6VHF will present Parks on the air

March: Michael AF6FB to present a program regarding Meshtastic networks

Winter Field 2025 was cancelled due to the weather with rain, wind and lightning in the forecast. It is suggested that next year we have a plan B.

Discussion held as to who will be in charge for the Summer Field Day, for site selection, etc.

Weekly Digital Mode Net Idea with EchoLink/Wires-X/Allstar/DStar. AJ is trying to set up an account.

April Board Meeting will not change meeting date, April 5th 2025.

General Meeting for April has been changed to April 25 due to Good Friday. Approved by Board.

General Meeting for May moved to May 23 due to RC availability. Approved by Board.

New Business

Discussion was held regarding using Zoom, may just use this for speakers/guests programs at this time. Approved by Board with one against.

Year-end Holiday Planning discussed and tabled to May to try to book Mimi's with Rodrigo's as a backup. Corey KE6YHX to set up an opportunity drawing for next month's meeting.

Good of the Club

Honorary Members elected for 2025 & 2026 membership by the Board

Jeff Mikoleit KK6YUP

Gordon West WB6NOA

Suzy West N6GLF

An adjournment was voted on and approved at 9:45am.

Submitted by Joyce KN6UKJ.

Cash Flow - Year to Date

1/1/2025 through 1/31/2025

Category	1/1/2025-1/31/2025
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INFLOWS

Badge	3.00
Dues 2025	195.00
Dues, PayPal 2025	825.00
TOTAL INFLOWS	1,023.00

OUTFLOWS

Activites Supplies	101.64
PayPal Fees	42.69
Website	25.00
TOTAL OUTFLOWS	169.33

OVERALL TOTAL	853.67
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Heathkit of the Month #127: by Bob Eckweiler, AF6C



ELECTRONIC TEST EQUIPMENT

Heathkit IP-18 1 - 15 VDC Regulated Power Supply

Introduction:

The IP-18 (**Figure 1**) supplies a well regulated 1 to 15 volts DC at up to a 500 mA continuous load; it was introduced in 1969 at \$19.95 (**Figure 2**). While inexpensive, this supply provides some advanced features, and to keep the cost low, leaves out some others. Since the IP-18 is still seen around a lot, many must have been sold. The IP-18 continued in production until 1977. It was selling for \$24.95 when it was replaced with the equally priced IP-2728 (**Figure 3**). The IP-2728 appears to be almost identical to the IP-18 circuit-wise¹, with only changes in



Figure 1: The author's IP-18 sporting a newly painted top cabinet shell.

styling and a few components; a fuse has been added. The IP-2728 remained in production until 1990. In the spring 1990 catalog the IP-2728 was listed, without an accompanying picture, priced at \$49.95. In the summer catalog it was shown, with its picture, but instead of a price, were the words "Sorry, no longer available." (**Figure 4**). The IP-18 specifications are given in **Table I**.

Here is a link to the index of Heathkit of the Month (HotM) articles:

http://www.w6ze.org/Heathkit/Heathkit_Index.html

Heathkit IP-18 Controls and Connections:

The IP-18 front and rear panel layout is shown in **Table II**. The **VOLTAGE** control sets

New Low Cost Heathkit 1-15 VDC Solid-State Power Supply . . .
Ideal For Transistor Circuitry Experimentation & Servicing

- Voltage regulated • Adjustable current limiting Output up to 500 mA continuous at 1-15 v.
- AC and DC programming • "Floating" output for either + or - ground • All silicon transistors
- Circuit board construction • Compact fit-anywhere size • So low in cost you can afford one for positive supply, one for negative supply

THE IDEAL POWER SUPPLY FOR ANYONE WORKING WITH TRANSISTORS. Whether you work in a laboratory designing transistor circuits, enjoy experimenting with solid-state circuits in your home workshop or service transistor equipment, the new Heathkit IP-18 is the power supply for you. Here in one compact design is a solid-state supply with voltage regulation, adjustable current limiting, AC or DC programming, and the correct output voltages, all at a remarkably low cost.

Kit IP-18, 5 lbs. \$19.95

IP-18 SPECIFICATIONS—Voltage output: 1-15 VDC, continuously adjustable. Load regulation: Less than 50 mV variation from no load to full load. Line regulation: Less than 50mV change in output voltage for a 10% change in line voltage. Ripple and noise: Less than 5 mV. Current output: 500 mA, maximum continuous load. Current limiting: Adjustable from 10 mA to over 500 mA. Transient response: 25 microseconds. Output impedance: .5 ohm or less to 100 kHz. Power requirements: 105-125 or 210-250 VAC, 50/60 Hz, 15 watts at full load. Dimensions: 5 1/4" W x 4 3/4" H x 5 3/4" D. Net weight: 3 3/4 lbs. Programming: AC or DC, 5000 ohm input resistance.

IP-18
\$19⁹⁵

Figure 2: Early ad for the IP-18 from the 1969 main catalog.

1. Notes begin on page 19.



Figure 3: The newly styled Heathkit IP-2728 that replaced the IP-18 in 1977.

the maximum voltage the supply will provide, and the **CURRENT** control sets the maximum current the power supply will provide.

Heathkit IP-18 Features:

The constant current feature of the IP-18 is a feature not often found in inexpensive power supplies. You can limit the current the supply will provide with the **CURRENT** control. Even the more expensive IP-2718 doesn't have this feature, though it does have fixed current limiting for circuit protection. A second feature is the output is isolated from chassis ground so you can series multiple power supplies. A convenient green binding post is provided so you can select which lead, if any, you want to reference to chassis ground. The chassis is connected to earth ground through its 3-wire AC power cord. A third feature is the ability to program the output voltage with either an AC or DC voltage. More on this feature later.

Heathkit IP-18 - What's Missing:

The IP-18 has a lot of features for a \$20 power supply, even back in 1969. It comes with

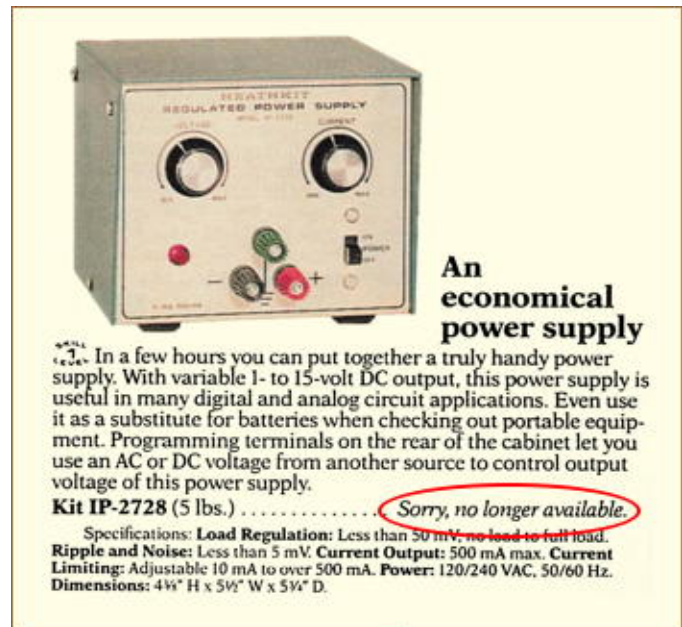


Figure 4: The last Heathkit IP-2728 ad appeared in the summer 1990 catalog, page 86.

IP-18 SPECIFICATIONS

Voltage Control	1 – 15 VDC continuously adjustable.
Load Regulation	Less than 50 mV variation from no load to full load.
Line Regulation	Less than 50 mV variation in output voltage for a 10% change in line voltage.
Ripple and Noise	Less than 5 mV.
Current Output	500 mA maximum continuous load.
Current Limiting	Adjustable from 10 mA to 500 mA.
Transient Response:	25 μ s
Output Impedance:	0.5 Ω or less to 100 kHz
Power Requirements:	105 – 125 or 210 – 250 VAC 50/60 Hz, 15 watts full load.
Dimensions:	5-1/2" wide x 4-3/8" high x 5-3/4" deep.
Net Weight:	3-1/4 lbs.

TABLE I

some drawbacks too. Missing, and almost crucial, are meters. Most all power supplies with constant current capability come with not just a voltmeter but also a separate ammeter. These expensive components are

missing on the IP-18. The early IP-18 power supplies came with a scale on the VOLTAGE control, but it must have been inaccurate as it was dropped shortly after production began (**Figure 5**)². The CURRENT control never had anything but a circular arrow showing **MIN** and **MAX**.



Figure 5 See Text

An external meter, or better two meters, are worth having available when using the IP-18, depending on your use. A simple VOM or two should be adequate.

IP-18 Circuit Description:

A schematic (**Figure 8**) is shown on page 14. The IP-18 uses five diodes, four transistors (including one FET transistor), and one neon bulb that is used only for power on indication. **Table III** lists these components and some of their pertinent specifications. The IP-18 circuit can be split into five parts. The power supply, the reference supply, the voltage regulator circuit, the current regulator circuit and the output filtering. Let's examine them:

Power Supply & Reference Supply:

It seems a little strange to talk about a power supply's power supply, but we'll press on! The power transformer has two primary windings that allow the IP-18 to be wired for 120 or 240 volt line voltage. The primary may be fused³ and has an NE-2H neon bulb for a pilot lamp. The neon lamp and its current limiting resistor (R8) wired across one winding of the transformer primary so it sees about 120 volts independently of the primary voltage the supply is wired for.

There are two secondary windings. One is 40 VAC center-tapped, rectified by two hard-to-find CER100 diodes⁴. The circuit is a com-

IP-18 FRONT PANEL ITEMS

Row - Top (Left -to-Right):

VOLTAGE	Potentiometer 5KΩ
Circular Arrow	MIN (full CCW), (MAX full CW)
CURRENT	Potentiometer 100Ω
Circular Arrow	MIN (full CCW), (MAX full CW)

Row - Bottom (Left -to-Right):

Pilot Lamp	Neon (NE-2H)
Output Binding Posts (3) in a triangle ($\frac{3}{4}$ " centers)	
-	Black (Negative)
(Gnd. symbol)	Green (Chassis Ground)
+	Red (Positive)
Power Switch	SPST slide switch ON OFF

IP-18 REAR PANEL ITEMS

Row - Top (Left -to-Right):

Transistor (Q3)	Insulated (cabinet for heatsink)
PROGRAMMING - EXTERNAL VOLTAGE CONTROL	
Terminal strip	screw type, 3-terminals
Terminals 1 - 2	AC (Jumpered for normal operation.)
Terminals 2 - 3	- DC +

Row - Bottom (Far Right):

Power cord exit	Three-wire with strain relief.
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(*Bold items in table are printed nomenclature.*)

TABLE II

mon full-wave rectifier, discussed here many times, and uses a pi RC filter. It produces about 25 volts⁵ DC. The second winding is 30 volts, and produces a regulated 20 VDC. Rectification is half-wave by another CER100 diode, and regulation is provided by a VR20 1-watt zener diode (D4). This voltage is the reference for the voltage regulator circuit. It produces a negative voltage between 0 and minus 16.7 volts, depending on the position of R4, the VOLTAGE control. The positive lead of the reference power supply is tied to the output voltage of the IP-18, so the voltage at the wiper of R4 varies from the output voltage to 16.7 volts below the output voltage.

IP-18 ACTIVE COMPONENTS

D1, D2, D3 (57-29)	CER100 Rectifier Diode 100V PRV 750 mA
(Substitute): (57-65)	1N2002 Rectifier Diode 100 PRV 1000 mA
D4 (56-45)	VR20 Zener Diode 20 V, 1 Watt (Sarkes Tarzian)
(Substitute): (56-45 new)	1N4747A Zener Diode 20V, 12.5 mA 1 Watt
D5 (56-26)	1N191 Germanium Diode 90 PRV, 5 mA
(Substitute):	ECG109 Germanium Diode 75 PRV
PL-1 (412-15)	NE-2H Neon Lamp 95 / 65 V ¼ watt, R series 30K
(Substitute):	C2A Neon Lamp Identical specs.
Q1 (417-140)	2N4304 JFET TO-5 $V_{GS(off)} -10$ V, I_{DSS} 0.5 mA
Q2 (417-109)	2N3566 NPN Transistor TO-5 40 V_{CEO} , 100 mA, 800mW, 20 MHz
Q3 (417-162)	2N3055 NPN Transistor TO-3 60 V_{CEO} , 115 W, HFE = 20 Min
Q4, Q5 (417-118)	2N3393 NPN Transistor TO-92 25 V_{CEO} , 825 mW, 500 mA

TABLE III**Voltage Regulator Circuit:**

Q1, a 2N4304 field effect transistor is wired as a current source, sourcing about 425 μ A to the base of Q2. Q2 and Q3 are wired as a Darlington pair with a typical overall current gain of 6,000. Q3 is a pass transistor that controls the output voltage of the supply. With Q4 and Q5 cutoff, all the current from the constant current source biases the Darlington pair on, allowing maximum voltage output. However, the reference power supply is connected between the supply output and the base of Q4. Let's assume the VOLTAGE control is set so the reference supply is at 10 volts. If the power supply output is greater than 10 volts (plus the small voltage drop due to Q4 and D1) ⁶ Q4 will begin to

conduct, routing part of the constant current to the negative side of the power output, in turn reducing the current available to Q2 and Q3 causing them to reduce the output voltage. Likewise, if the output voltage is lower than the set voltage, Q4 draws less current and the voltage rises. So the output voltage is regulated to a voltage slightly higher than the voltages by the VOLUME control. That is why the minimum voltage is specified as 1V.

Current Regulator Circuit:

R6, the CURRENT control is a 100 Ω potentiometer in series with R7 (0.51 Ω) in the output lead. As long as the combined drop between R6 and R7 is below about 0.6 volts Q5 remains cutoff. However, if the current through these resistors exceeds that voltage, Q5 will start to conduct, also routing some of the constant current away from Q2 and Q3 causing the voltage to drop, and keep the output current steady. With R6 set to MAX (0 Ω) The maximum current will be somewhere near 1 amp due to the resistance of R7 as well as other stray resistances. The minimum current that can be set is less than 10 mA.

The Output Circuit:

There are only two components in this circuit. The first R9 is a 3.3 K Ω bleeder resistor across plus and minus output terminals. It sets a minimum load for the regulator circuit. The second is C4, a 100 μ f electrolytic capacitor, also across the output terminals. It is probably there to add some additional low frequency filtering. however this capacitor is a current source and is beyond the current regulator. Thus, if the power is on and a device is connected across it, the device will initially see a higher voltage that causes a current surge before the current settles down to the correct operating current.

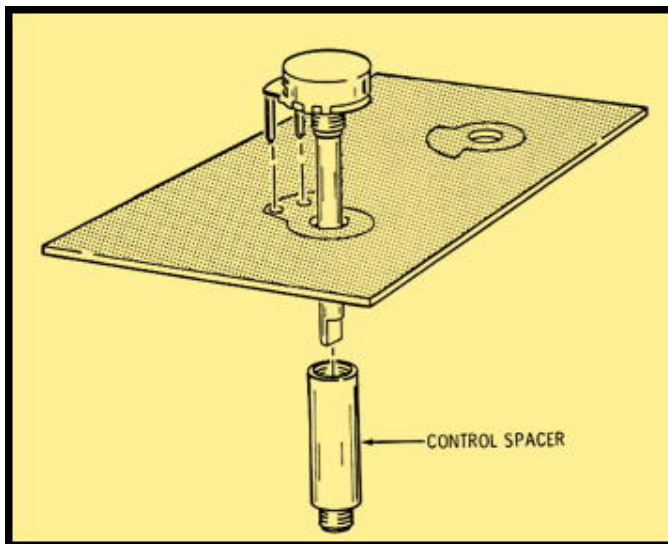


Figure 6: Long shaft controls and control spacers allow the circuit board to mount to the front panel.

IP-18 Assembly:

Most of the components in this kit mount on a single circuit board, including the two controls. The controls have long shafts and a control spacer (see **Figure 6**) is used for mounting. External parts that mount directly to the chassis are the three binding posts, the neon lamp lens, the power slide switch, the three-screw programming terminal strip, the power cord with strain relief and Q3, which uses the chassis as a heatsink. Q3 is socketed and has a protective insulated cover since its case is at 25 volts. Internally, the circuit board is mounted vertically using the two control spacers and an 'L' bracket (see **Figure 7**). The transformer mounts directly to the chassis bottom with #8 hardware. All the transformer leads terminate at the circuit board, as do the line cord hot and neutral leads. Selection of the line voltage is done with jumpers on the circuit board.

The IP-18 Operation:

The **VOLTAGE** and **CURRENT** controls set the maximum voltage and current the supply will output. If the IP-18 contained meters you would set the **VOLTAGE** control with the

voltmeter and then short the output and set the **CURRENT** control using the ammeter. It is always best to start with the **CURRENT** control near minimum when setting the current. You can still do this with an external VOM meter. As long as the set current is not exceeded, the voltage will remain constant; this is considered the voltage mode. As soon as the current is exceeded, the voltage will decrease as needed and the current will remain constant; this is considered the current mode. It is all governed by Ohm's law and the resistance of the load.

In the following discussion there are three graphs (**Figures 9, 10 and 11**) that illustrate the power supply output under three different conditions. The data plots in cyan (light blue) show the output current; they are plotted against the vertical axis on the left at 31.25 mA per division. The data plots in violet show the output voltage; they are plotted against the vertical axis scale on the right at 1 V per

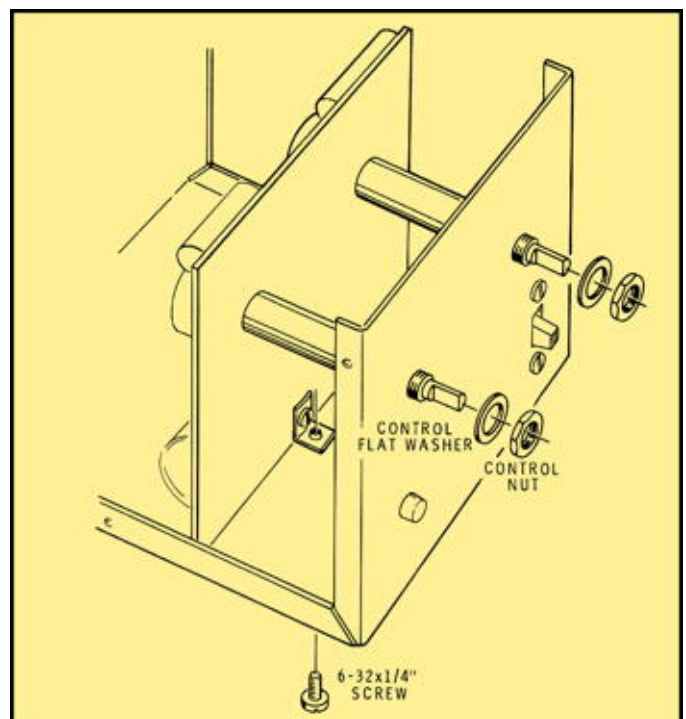
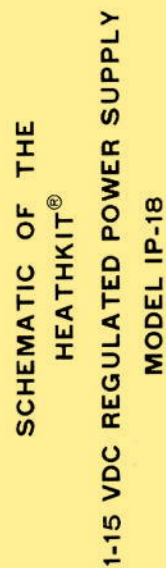


Figure 7: Installing the circuit board to the front panel and chassis bottom.



- NOTES:
1. ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE MARKED.
2. ALL CAPACITORS ARE IN μF .
3.  INDICATES A DC VOLTAGE MEASUREMENT FROM POINT INDICATED TO NEGATIVE (-) OUTPUT TERMINAL. WHERE TWO VOLTAGES ARE SHOWN, THE VOLTAGE PRESENT DEPENDS UPON THE SETTING OF THE VOLTAGE CONTROL.
4. ALL VOLTAGES WERE MEASURED WITH NO LOAD ON THE OUTPUT TERMINALS AT 117 VAC 60 Hz INPUT.
5. VOLTAGE MEASUREMENTS WERE MADE WITH AN 11 MEGOHM INPUT VOLT-METER AND MAY VARY $\pm 10\%$.
6. ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION.

Figure 8: A schematic of the IP-18 from the Heathkit manual [595-983-01] Dated June 20, 1969

division. Remember that the IP-18 is specified to output between 1 volt and 15 volts and 10 mA to 500 mA. However, in the first two examples the minimum current that can work with 1 V and 40 Ω is 25 mA.

Current Control:

Figure 9 is a graph illustrating the action of the CURRENT control. The VOLTAGE control is set for 10 V, and then a 40 Ω load is placed across the output of the power supply. Initially the CURRENT control is set at 500 mA, near maximum. At this point 10 volts is being applied across the load and the current is 250 mA by Ohm's law:

$$I = \frac{E}{R} = \frac{10V}{40\Omega} = 250mA$$

As the CURRENT control is decreased from 500 mA to 250 mA, both the voltage and actual current remain 10 V and 250 mA. Once the CURRENT control decreases past 250 mA it takes control of the output and the voltage begins to drop linearly with the current. The current controls the voltage by Ohm's law. When the CURRENT control reaches near minimum the current reaches 25 mA and the voltage is then 1V:

$$E = IR = 25mA(40\Omega) = 1V$$

When the current is above the knee in the graph the voltage remains constant; when it drops below the knee the voltage is reduced due to current limiting. The location of the knee depends upon the load resistance and the setting of the VOLTAGE control, and is easily calculated with Ohm's law.

Voltage Control:

Figure 10 is a graph illustrating the action of the VOLTAGE control. The CURRENT control is set for 250 mA, and then a 40 Ω load is placed across the output of the power supply.

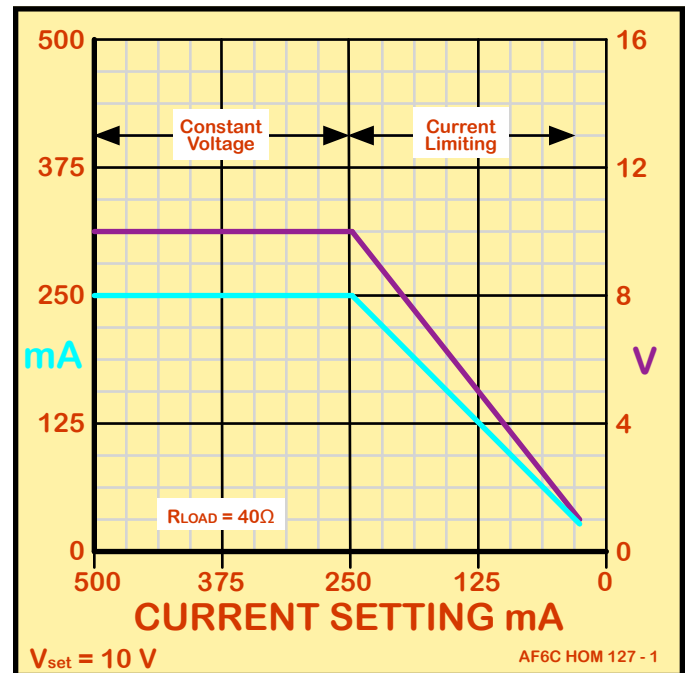


Figure 9: A Graph showing the functioning of the CURRENT Control with a fixed load and fixed VOLTAGE control setting. (Constant Voltage mode).

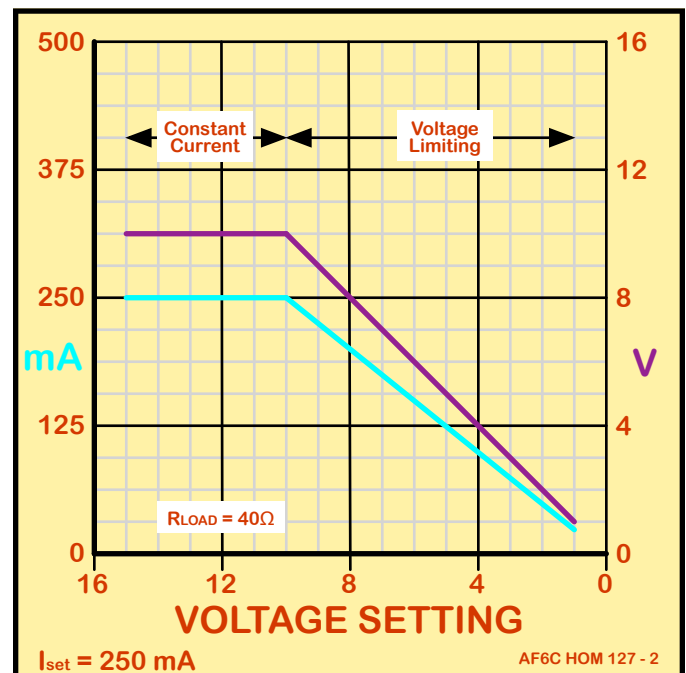


Figure 10: A graph showing the functioning of the VOLTAGE Control with a fixed load and fixed CURRENT control setting. (Constant Current mode).

Initially the VOLTAGE control is set at 15 V, near maximum. At this point 10 volts is being applied across the load and the current is 250 mA by Ohm's law:

$$E = IR = 250\text{mA}(40\Omega) = 10\text{V}$$

As the VOLTAGE control is decreased from 15 V to 10 V both the current and actual voltage remain 250 mA and 10 V. Once the VOLTAGE control decreases past 10 V it takes control of the output and the current begins to drop linearly with the voltage. The voltage controls the current by Ohm's law. When the VOLTAGE control reaches near minimum the voltage reaches 1 V and the current is then 25 mA:

$$I = \frac{E}{R} = \frac{1\text{V}}{40\Omega} = 25\text{mA}$$

When the voltage is above the knee in the graph the current remains constant; when it drops below the knee the current is reduced due to voltage limiting. The location of the knee depends upon the load resistance and the setting of the CURRENT control, and is easily calculated with Ohm's law.

Varying Load:

In the two previous sections the fixed load of 40 Ω was used for convenience, but what happens when the load changes dynamically?

Figure 11 shows the power supply operation, with the VOLTAGE and CURRENT controls set to 10 V and 250 mA respectively, for a load that is varying between 80 Ω and 5 Ω . Between 80 Ω and 40 Ω the voltage stays constant at its set voltage, but the current rises from 125 to 250 mA. It is not a straight line but a reciprocal curve, that, if were to continue, would become asymptotical to the 0 Ω vertical axis. At 40 Ω the current now reaches its set value and it remains constant while the voltage decreases linearly down to a minimum of approximately one volt. or less.

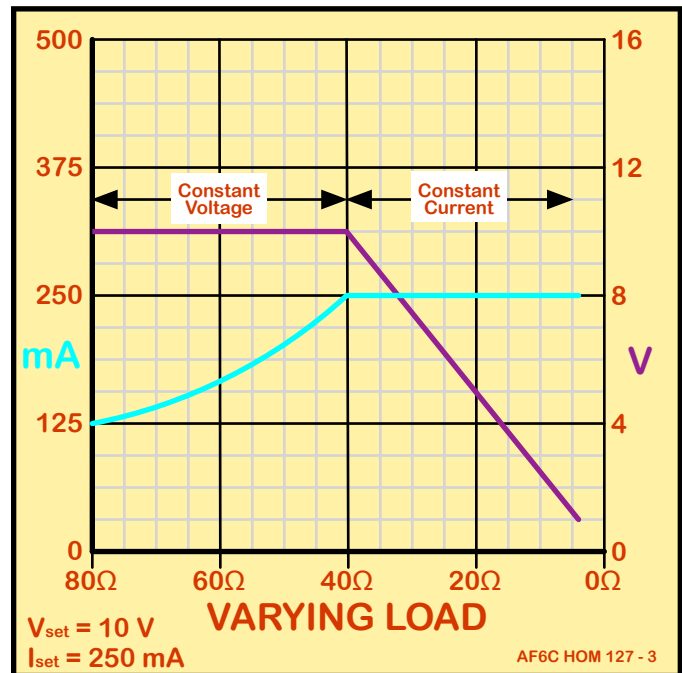


Figure 11: A graph showing the result of changing the load with fixed VOLTAGE and CURRENT control settings.

IP-18 Remote Programming:

The output voltage can be programmed externally by applying an appropriate voltage to the three-screw terminal strip on the rear of the IP-18 (**Figure 12**). Either AC or DC programming may be used. There is a jumper



FIGURE 12: A view of the rear of the IP-18 showing the programming terminal strip. Insulated transistor is on the left and the power cord exit is on the right.

across the AC terminals on the **PROGRAMMING (EXTERNAL VOLTAGE CONTROL)** terminal strip that is required for normal operation. It is removed when either AC or DC remote programming is used.

DC Remote Programming:

With the jumper removed, a DC programming voltage can be applied to the DC terminals. Be sure to observe polarity and do not exceed 16 volts. The input impedance across the DC terminals is 5 K Ω . The programming voltage should not be referenced to ground. With the VOLTAGE control at MAX the output of the IP-18 will be the same as the input voltage, less a small drop due to the base drop of Q4. The VOLTAGE control can then be used to proportionally control the output voltage. For example, with the VOLTAGE control halfway between MAX and MIN the output voltage will be half of the programming voltage. When finished using the programming voltage, be sure to replace the jumper across the AC terminals on the terminal strip.

AC Remote Programming:

AC remote programming is a bit esoteric. It allows placing an AC voltage on top of the DC output voltage. The sum of the DC and AC voltage should not exceed 16 volts or go negative. To maintain the DC reference source the AC source should have a low impedance with respect to the 5 K Ω VOLTAGE control. Heath recommends "...a low impedance transformer secondary."

Heath, in the manual, describes the output of the power supply when using AC programming thusly:

"The output voltage from the Power Supply will now be a pulsating DC, with a modulation component which approximates the

waveform of the external AC control voltage. The VOLTAGE control will set the average voltage of the pulsating DC output. The CURRENT control operates normally."

Operation With Multiple IP-18s:

Multiple IP-18 Power Supplies may be connected together for higher voltages or currents.

Series Operation:

Since the output of the IP-18 is isolated from chassis ground, two or more of them may be easily connected in series to provide voltages above 15 volts. The current control on each supply should be set identically if current limiting is desired (Figure 13).

Parallel Operation:

Two or more IP-18s may be wired in parallel to supply additional current, though it is a bit more tricky. Before the power supplies are connected in parallel, the voltage of each IP-18 should be separately set to the same desired voltage using an accurate voltmeter, and a resistor (0.1 Ω) should be placed in the positive lead of each supply to help them share the load (Figure 14). It seems to me there should be a better way, using the programming terminals on the rear panel, to keep the voltages close to each other?

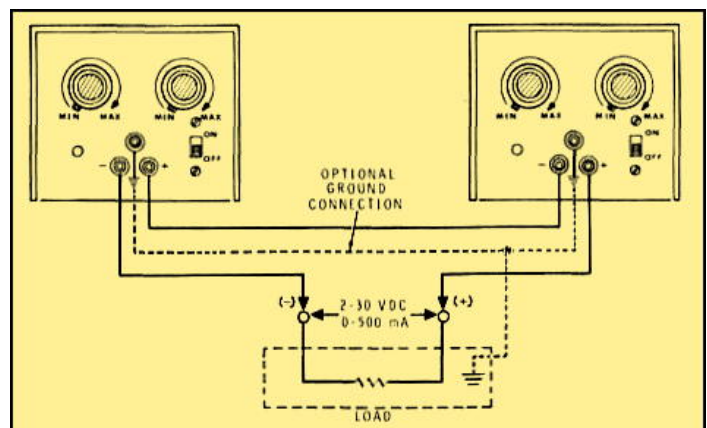


FIGURE 13: An illustration from the manual showing wiring for series operation of multiple IP-18s to get higher current output (See Text).

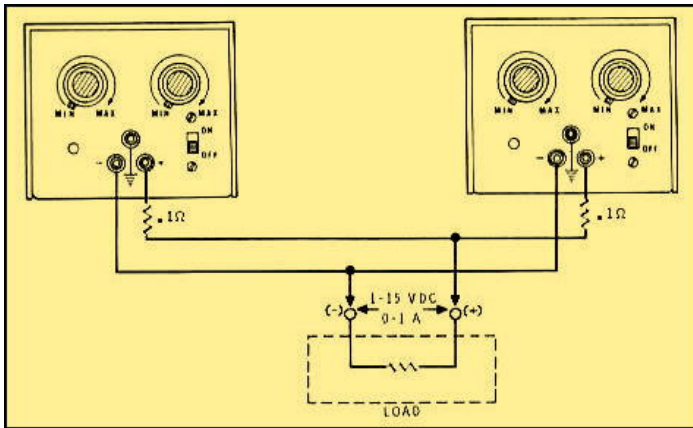


FIGURE 14: An illustration from the manual showing wiring for parallel operation of multiple IP-18s to get higher current output (See Text).

Uses for the IP--18:

This is a handy little power supply for various uses around the shack. It would be so much better if it had at least one built in switchable meter. My test equipment includes a Lambda dual supply, each good for 0 – 20 volts at up to 1.7 amps, and a Heathkit IP-2718 Triple Power Supply (See HotM #108)⁷. Both are useful but hard to move and take up coveted bench space.

My first use of the IP-18 was to power up a Heathkit HD-1424 Active Antenna (See HotM #6)⁸. The active antenna can use an internal 9-V battery, but it was easier to use the IP-18. I tend to remove batteries from infrequently used equipment, for obvious reasons.

Right now it is being used to power an old Motorola transistor AM radio that I want to check out and see if it's viable to fix.

Another possible use is to charge re-chargeable batteries. Many batteries state their maximum recommended charging current and floating charge voltage. If the IP-18 voltage is set for the float voltage and the current is set for the recommended charging current, the power supply will operate in the

constant current mode as the battery voltage increases with charge, and then switch to the constant voltage mode at the floating voltage.

Comments:

I purchased the IP-18 at the yearly OCARC auction last October. On examination the supply was found to be received in working condition. An internal check revealed the four electrolytic capacitors to be within tolerance as to capacitance and leakage. I've added three of the four capacitors to my next purchase list anyway. A cost effective replacement for the 2500 μ f 30V **axial** lead capacitor has not been found yet. The price of axial electrolytic capacitors have soared recently. \$16+ vs. \$3 for a radial lead one (2700 μ f 50V).

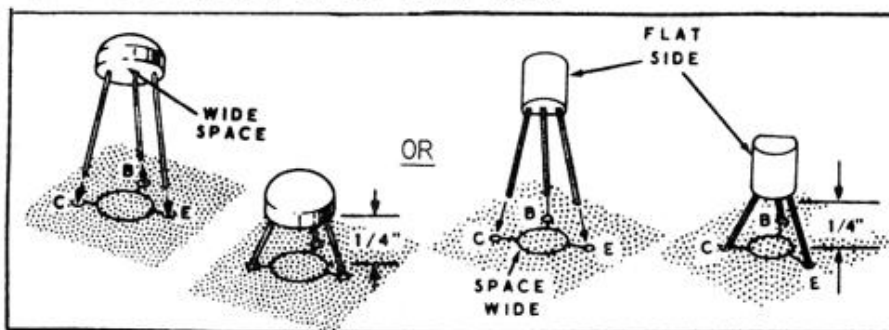
While the IP-18's chassis is in good shape, its cover had been repainted black and was badly scratched, and the paint, in places was extremely thick. The cover was stripped to bare aluminum and given two coats of Rust-Oleum Satin Oregano. I had planned to use Satin Nutmeg but the local Home Depot was out of stock. You can see the result in **Figure 1**.

Another problem-'in-the-making' on this IP-18 is the **VOLTAGE** control, which turns stiffly. The problem could be in the control or the control spacer. Removal of the circuit board is required to find out, and that will be done when the capacitors are changed.

I was recently given a bunch of Heathkit specification sheets that Heath passed out over the years as part of their advertising. I'm in the process of scanning them and putting them up on the site. Most include a schematic which I've tried to reproduce in reasonable resolution. So far I've put up 150 of them and will get around to more as time permits. The site is:

<https://www.w6ze.org/Heathkit/HeathSpecSheetsIndex.html>

Check for proper installation of Q2 (#417-109).



The transistor used at this position has two different basing configurations; thus, it may be installed incorrectly.

Figure 14: Heath Technical Bulletin IP-18-2

Heath Technical Notes:

I recently obtained the Heath Technical Exchange Bulletins for 1977, and 1982 through 1989. Each comes with a yellow section in the back that is an index of all the technical bulletins published for each kit and the year of the issue that the bulletin was published in. These bulletins are updated by service technicians in the field, as well as Heath engineers and technicians. To my surprise I came across one written by one of our former members, now a silent key, Bob Dillard - K6DNR who had worked at the Heathkit store on Ball Road.

IP-18 Technical Bulletins:

Heath published two service bulletins on the IP-18:

- IP18-1 Ripple & Noise Filtering (11/4/70)
- 2 Blowing Fuses (8/29/77)

I only have access to the second one, which is shown in **Figure 14**. The reference to a fuse caught my attention. On a schematic from a later manual [595-983-04], a fuse is present and a photo accompanying the schematic shows the fuse mounted internally. It also identifies the three rectifier diodes to now be 1N2002 (57-65) diodes.

Notes:

1. Noted changes are mentioned later in the text.
2. Photo courtesy of Chuck Pension - WA7ZZE.
3. An internally mounted fuse was added to the IP-18 sometime during the production run: 3/16 amp slow-blow ($\frac{1}{8}$ amp for 240V)
4. In later IP-18 production the CER100 was replaced with the (57-65) 1N2002 diode (100 PRV, 1 A).
5. Early IP-18 schematics show Q3 collector voltage as 29 V. Later schematics show the voltage as 25 V,
6. Q4 base emitter drop is about 0.55V and D1, a germanium diode, is about 0.2 V resulting in an offset of around 0.75 volts.
7. Heathkit of the Month (HotM) Heathkit IP-2718 Tri-Power Supply article is available at: https://www.w6ze.org/Heathkit/Heathkit_108%20IP2718.pdf
8. HotM Heathkit HD-1424 Active Antenna article is available at: https://www.w6ze.org/Heathkit/Heathkit_006_HD1424.pdf

73, from AF6C



Remember, if you are getting rid of any old Heathkit Manuals or Catalogs, please pass them along to me for my research.

This article is Copyright 2025 R. Eckweiler, AF6C and The OCARC Inc.

Thanks - AF6C

OCARC 2024 AUDIT REPORT

Cash Flows

INFLOWS	
Auction Income	2,962.50
Badge Income	6.00
Christmas - Opportunity Drawing	330.00
Christmas Dinner Ticket Sales	675.00
Donation	14.00
Donations - Field Day	223.00
Dues, Membership (Paypal 2025)	705.00
Dues, Membership (Paypal) 2024	1,378.46
Dues, Membership 2024	500.01
Dues, Membership 2025	120.00
Field Day Food Income	240.00
Interest	178.39
Opportunity Drawing -Monthly	441.00
Refunds Received	300.00
Sale Of Equipment	683.50
TOTAL INFLOWS	8,756.86

OUTFLOWS	
Auction Payout	1,334.50
Bank Checks (Refill)	23.20
CA Statement Of Info filing	20.00
Christmas Drawing Prizes	996.93
Christmas Party Expense	1,286.12
Field Day - Propane	57.07
Field Day Equipment	131.94
Field Day Food	487.31
Field Day Rental - Tent	310.00
Flowers Expense	50.00
Guest Speaker Meal - Exp	281.00
Historian Expenses	91.90
Insurance Expense 2025	300.00
PayPal Fee	137.38
PO Box Rental	170.00
Refreshments Expense	64.11
Software License	24.00
Storage of Equipment - Ann Millard	650.00
Web Site Hosting	380.00
WFD - Food	62.91
WFD - Propane	40.85
WFD Flowers	34.00
WFD Rental - Tent	170.00
ZOOM subscription	159.90
TOTAL OUTFLOWS	7,263.12

OVERALL TOTAL **1,493.74**

Asset Balances

Beginning 2024	1/1/2024	End 2024	12/31/2024
Wells Fargo Checking	11885.02	Wells Fargo Checking	3649.48
Wells Fargo CD	0	Wells Fargo CD	6678.39
Cash	137	Cash	264
Paypal	618.98	Paypal	1657.86
Outstanding Checks	-1885.01	Outstanding Checks	0
	10755.99		12249.73
		Net Change 2024	1493.74

Audit Acceptance:

Bob Eckweiler

Bob Eckweiler AF6C

Tim Millard

Tim Millard N6TMT

Tim Goepfinger

Tim Goepfinger N6GP

Date Signed :

February 1, 2025

February, 1, 2025

A Visit to the K7SI Winter Field Day in Wilder Idaho

By Tim Goeppinger N6GP



The Fire Station at Wilder Idaho K7SI WFD Site me feel like I was part of their family. The day finished with a dinner out at a Mexican restaurant with the family, which was surprisingly good.

In the week before Winter Field Day, a series of events had me agonizing over what to do. My friend of 35 years, Paul Bader passed away on January 18th in Weiser Idaho, which is a small town on the Idaho/Oregon border. A few days later, Paul's family announced that his memorial service would be the following Saturday morning on January 25, the same day as Winter Field Day. My wife Edna was already on a week-long train trip in Mexico, and I was intended to be the one to stay home with our dogs. My mind was mulling this over and over. I really wanted to be part of the send-off to Paul, but I didn't want to abandon my friends at the OCARC WFD. On Thursday, Jan 23, things just opened up for me to make the pilgrimage to Idaho. First, our WFD was cancelled. Secondly, I checked the weather in Idaho, and there were no storms, and the roads were dry with no ice. Thirdly, I found a dog sitter to stay Friday thru Monday nights. I booked flights, rental car, and hotel room.

The Allegiant Air flight from John Wayne to Boise was smooth, and I arrived around 3PM Friday afternoon. I picked up my rental car, and drove slightly over an hour to Weiser. I checked into the motel, then Paul's family invited me to their house for dinner. Saturday was a meaningful time honoring and remembering Paul. Paul's family made

Back at my motel room Saturday night, it was obvious that the celebrations of Paul's life were now over. My flight wasn't until Monday afternoon, so I had time to kill on Sunday. I decided to check the Location Finder on the Winter Field Day site to see if there were any Field Day sites between Weiser and Boise. There were 2! One at W7SI about 1 hour south in Wilder, and another one, K7SWI in Caldwell. I called a friend and agreed to meet with him in Emmett further north after the 3PM close of WFD. I planned to visit each WFD site for about an hour each, then visit my friend.



Vertical Antennas for WFD



K7SI Operating Tables 6I Idaho

I got going in good time Sunday morning about 9:30 AM. There was good country music on the radio on my 1 hour trip to The Snake River ARC K7SI site in Wilder. I parked my rental car at Rural Fire Dept Fire Station in the sunny, but 35 degree weather. I noticed vertical antennas on trucks on one side of the building. I had no idea if the front door was locked or not. I sheepishly opened the door and entered a multi-purpose room. They said "Hi, are you here for Winter Field Day?". I said "Yep, I am Tim, N6GP", and introduced myself around the room. They invited me to sign their sign-up sheet, which I did.

The Snake River Club takes emergency preparedness very seriously. This was a 6I (indoor) field day, and most of the stations were contained in 'Go-kits' that were each cracked open on the tables in the room.

What struck me about this WFD was how quiet it was.

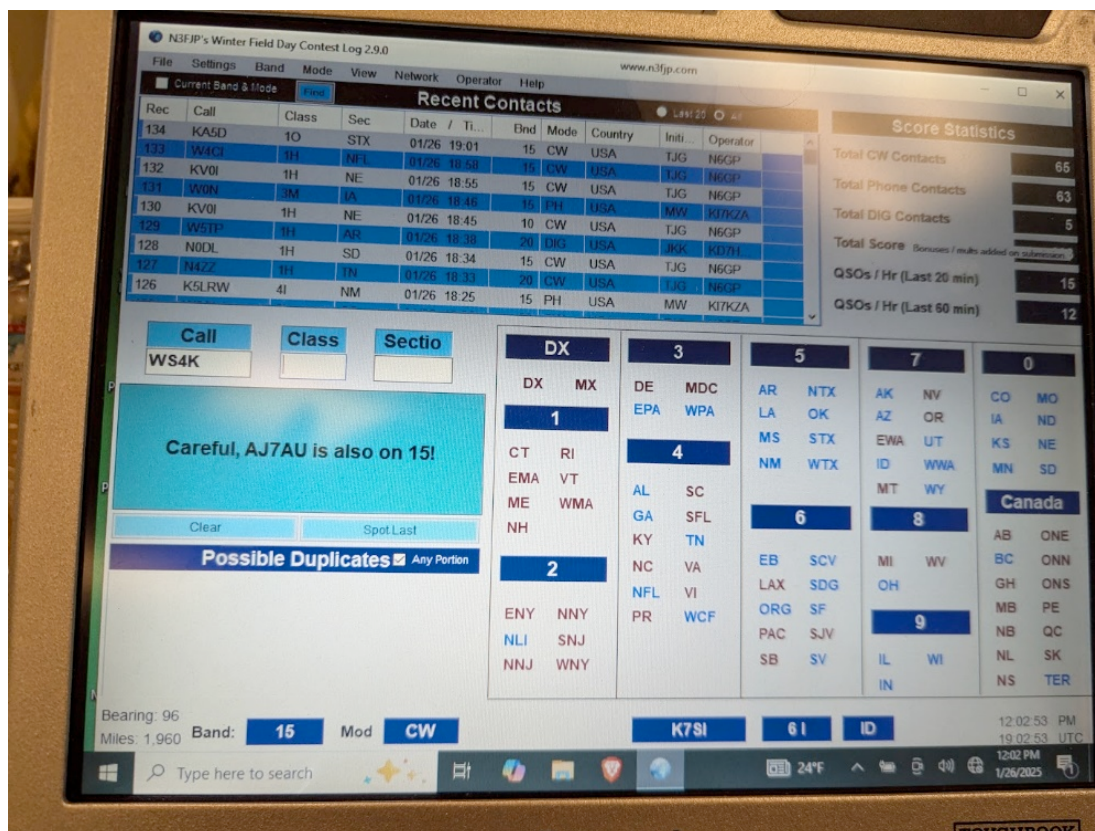
I wondered – are they all on CW or digital? More on this later....

I walked around the room, trying not to disturb the operators. I encountered John KD7HGS at their digital station. He was frustrated trying to get his new Xiegu G90 radio to work on PSK31 with the FLDIGI program. It would receive OK, but just not key the radio to transmit. Even though I knew nothing about the Xiegu radio, I offered my help, since I have many years' experiences with digital modes. I looked at the FLDIGI software, and it all looked fine. I said "there must be a VOX problem. I perused the Xiegu manual, which is all of 30 pages, and found the menu item for VOX. John confirmed that it was ON. I said "What about VOX Gain?" He found the setting, and said it was 0. I told him to turn it up a bit. He did, and said "Its transmitting!" He stood up, shook my hand, and said "Thank you! I had been struggling with that for 2 hours!"

Like I said before, other than some quiet conversations in the room, it was as quiet as a library. I looked, and 5 of their stations were on phone. Once every 5 minutes or so, a phone station would call someone, and they would rarely complete a contact. It turns out that the Snake River club prides itself on doing their field days with QRP (5 watts), in order to capture the power multiplier for their score. Plus, I think QRP is their culture, and they enjoy the challenge of it.



N6GP operating CW



N3FJP Software Showing Networked Log

I asked one of the ops if I could operate for a while. Bob W7RLS volunteered to give up his seat. His station was phone, but was capable of CW, where their sole CW op had worked on Saturday. Compared to W6ZE field days, this was really roughing it. Besides being QRP, the antenna was a Comet CHA-250HD vertical, being fed by RG-58 coax. CW had to be hand-sent using paddles, as there was no computer CW interface. Also, no rig interface, so I had to remember to change the band in the software when I changed bands. And on top of everything, the Icom IC-706 I was using had no CW filter, so the bandwidth I listened to was about 2.6 KHz. Thankfully I was familiar with the N3FJP software. One advantage of QRP is that you do not need to use band pass filters, and that the PSK31 station on 14.070 had almost no interference on my CW at 14.040. I operated for at least 2 hours on CW on 20, 15 and 10 meters. All QSOs were Search and Pounce, and many times I had to call the stations 5 to 10 times to get their attention. CQing (running) was futile. With QRP, CW filled their log at a much faster rate than SSB.

I was impressed at how their club had mastered the technique of network logging in the N3FJP software. All 6 stations were connected via WIFI to a central server that was also running the N3FJP software. It was cool to see the entire log at once from all of the stations together. I still am puzzled why OCARC can't seem to conquer this 'Holy Grail' of network logging.





Inside joke at K7SI. These are the ops that were on the air overnight

I was really enjoying working WFD with the Snake River ARC Club, and I gave up my original plan to go to the Caldwell Club. Additionally, my friend from Emmett called to cancel. So, I stayed to the end at 3PM, and helped them coil up their coax etc. They had to be out of the fire station by 5PM, so the new, extended WFD hours put a crimp on their tear-down time.

When things were pretty well packed up, I thanked them for a wonderful day, and said my goodbyes. They said that if I ever happen to be back in their area again for WFD, or any other event, that I was welcome to come back.

Being part of the Amateur Radio Community is an awesome way to live – you can drop in to almost any ham gathering anywhere in the world, and feel instantly welcomed. It is an amazing feeling. Try it the next time you are travelling somewhere.

Paul Miles SK WA6LJV

1941 - February 4th 2025



On February 5th Pamela Miles emailed a club member reporting that her Husband Paul - WA6LJV had passed away the day before. Paul faithfully attended our meetings since he first joined back in February of 2011 and was a continuous member up to his passing. Cause of his death was not given, though His wife reported he was having health issues.

The **ORANGE COUNTY AMATEUR RADIO CLUB, INC.**

RF - VOLUME 66 ISSUE 2 – February 2025

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